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an invisible companion revolve around each other in a period of four days, and this binary system and a second invisible component revolve around each other in from ten to twenty years. Easily the most interesting of all stellar systems thus far studied is that of *Castor,* as described above. It does not follow that the two invisible members of this quadruple system are really dark bodies. If they are two or three magnitudes fainter than the bright components, they would be invisible; for their light would be lost in that of the principal stars.

It should be said that the great value of the discovery of this interesting system lies not so much in the discovery itself as in the opportunity thereby afforded to study it thoroughly.

November 25, 1904. W. W. CAMPBELL.

A DIVISION OF THE STARS IN SOME OF THE GLOBULAR CLUSTERS, ACCORDING TO MAGNITUDE.

The programme of observations for the Crossley reflector undertaken by the late Professor KEELER contained eight well-known globular star-clusters.

The general appearance of these clusters is very similar; they are of nearly the same angular dimensions, and the magnitudes of the component stars are remarkably alike.

In each of these clusters practically all of the stars can be separated into two classes of magnitudes. Perhaps a third of the whole number lie between eleventh and thirteenth magnitude, while almost all of the remainder are very faint, being about sixteenth magnitude. The appearance is that of two layers, one of bright stars superposed upon another of very faint stars.

But few stars of magnitudes fourteen to fifteen and one half are to be found in these clusters.

Photographs of the ω *Centauri* cluster obtained at the Harvard College Observatory station at Arequipa exhibit the same division of the stars in that cluster into two groups, as does the Crossley series. The limits of the area of the faint stars are fully as sharply defined as those of the brighter ones, and the centers of the two groups coincide. We are therefore led to the conclusion that in each case the observed division is in the same group of stars in space. That it is characteristic of all clusters of this type is not certain, but the lack of any exceptions in the clusters observed strongly suggests such an hypothesis.

Two hypotheses to account for the peculiar distribution in magnitude suggest themselves: 1st. That it is due to a difference in the size of the stars; 2d. That it is due to a difference in constitution or physical condition.

The almost complete lack of physical data at present prevents any useful discussion of these hypotheses. Although the first appears to be the most probable, yet it is conceivable that this peculiar distribution might result from a difference in constitution of the stars themselves.

In this connection attention may be called to the relation which has been supposed to exist between the nebulæ and the star-clusters. The belief has been gaining way since photography has shown the real structure of so many of these objects that they are but different stages in the process of evolution; that a star-cluster has been formed by the condensation of the matter in a nebula.

A study of the nebulæ which have been observed with the Crossley reflector shows that a large proportion are spiral, and that practically all the spirals are lenticular or disk-shaped. Many of them are relatively very thin. Now, if the globular clusters are really spherical, as seems probable, it is difficult to see how they could have originated from a disk-shaped nebula (spiral?).

As there are other forms, also, of nebulæ and star-clusters, it is not necessary to assume that the order of evolution mentioned above is the only one. But the natural tendency has been to connect such changes as these with the spirals which, by their appearance, seem to indicate greater systematic internal activity than others.

C. D. PERRINE.

July 17, 1904.

OBSERVATIONS OF A RILL EXTENDING THROUGH THE LUNAR VALLEY OF THE ALPS.

On the night of April 23, 1904, while showing the regular Saturday-night visitors the Moon through the 36-inch refractor, I noticed a rill at several points in the Alpine Valley. The seeing was too poor to make satisfactory observations, but at times the rill could be glimpsed for nearly the whole length of